

wherein X is O or S; n is an integer from 5 to 32 inclusive; y is an even integer from 2 to 12 inclusive; and y is less than or equal to n.

22. (New) The compound according to claim 21 wherein R^4 is selected from the group consisting of C_1 - C_6 alkoxy, furan, thiophene, methoxyphenyl, dimethoxyphenyl and trimethoxyphenyl.

23. (New) The compound according to claim 21 wherein the hydrophilic headgroup is selected from the group consisting of poly(ethylene glycol), C_1 - C_6 alkoxy poly(ethylene glycol), poly(ethylenimine), N,N-di(aminoethyl)carbamoyloxyethyl-, choline, monosaccharide, disaccharide, ethanolamine, phosphatidylcholine, phosphatidylethanolamine, cardiolipin, and phosphatidylmonosaccharides and phosphatidyldisaccharides.

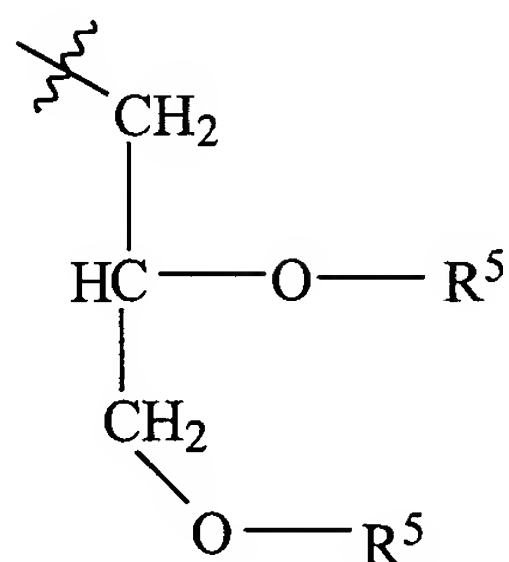
24. (New) The compound of claim 23, wherein the hydrophilic headgroup is poly(ethylene glycol), C_1 - C_6 alkoxy poly(ethylene glycol) or poly(ethylenimine), N,N-di(aminoethyl)carbamoyloxyethyl- .

25. (New) The compound of claim 23, wherein the hydrophilic headgroup is poly(ethylene glycol) or C_1 - C_6 alkoxy poly(ethylene glycol) and the poly(ethylene glycol) moiety has an average of 1 to about 300 ethylene glycol units.

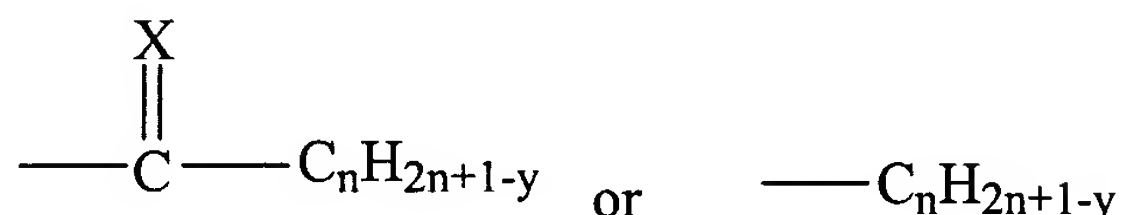
26. (New) The compound according to claim 25 wherein the poly(ethylene glycol) moiety has an average of between about 10 and 150 ethylene glycol units.

27. (New) The compound according to claim 21 wherein either R^1 or R^2 is poly(ethylene glycol), C_1 - C_6 alkoxy poly(ethylene glycol) or poly(ethylenimine) or N,N-di(aminoethyl)carbamoyloxyethyl- and the other of R^1 or R^2 is hydrogen; and R^3 is selected

from the group consisting of cholesterol, a cholesterol derivative and a group of the formula:

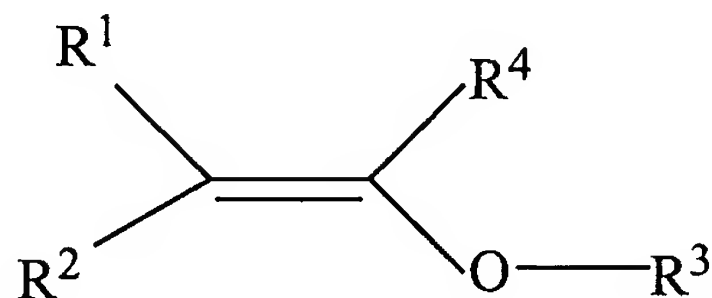


wherein each R^5 is independently a hydrophobic group of the formula:



wherein X is O; n is an integer from 5 to 32 inclusive; y is an even integer from 2 to 12 inclusive; and y is less than or equal to n.

28. (New) A vinyl ether lipid compound of the formula:



wherein one of either R^1 or R^2 is a hydrophilic headgroup and the other of R^1 or R^2 is hydrogen, a second hydrophilic headgroup, or a crosslinker joining at least one other molecule of the vinyl ether compound at the R^1 or R^2 position;
 R^3 is an organic hydrophobic moiety; and

R⁴ is selected from the group consisting of C₁-C₆ alkoxy, furan, thiophene, methoxyphenyl, dimethoxyphenyl and trimethoxyphenyl.

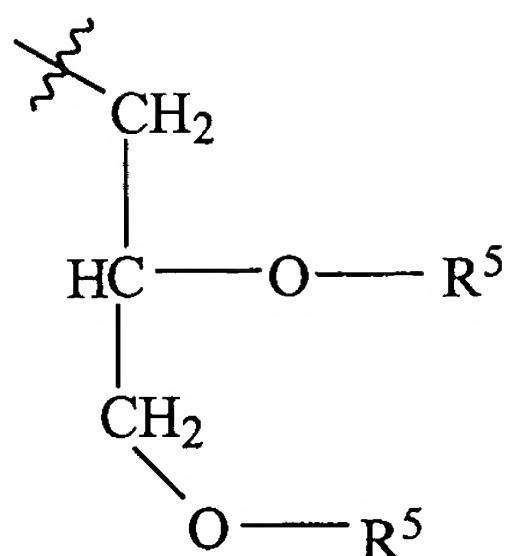
29. (New) The compound according to claim 28 wherein the hydrophilic headgroup is selected from the group consisting of poly(ethylene glycol), C₁-C₆ alkoxy poly(ethylene glycol), poly(ethylenimine), N,N-di(aminoethyl)carbamoyloxyethyl-, choline, monosaccharide, disaccharide, ethanolamine, phosphatidylcholine, phosphatidylethanolamine, cardiolipin, and phosphatidylmonosaccharides and phosphatidyldisaccharides.

30. (New) The compound of claim 29, wherein the hydrophilic headgroup is poly(ethylene glycol), C₁-C₆ alkoxy poly(ethylene glycol) or poly(ethylenimine), N,N-di(aminoethyl)carbamoyloxyethyl- .

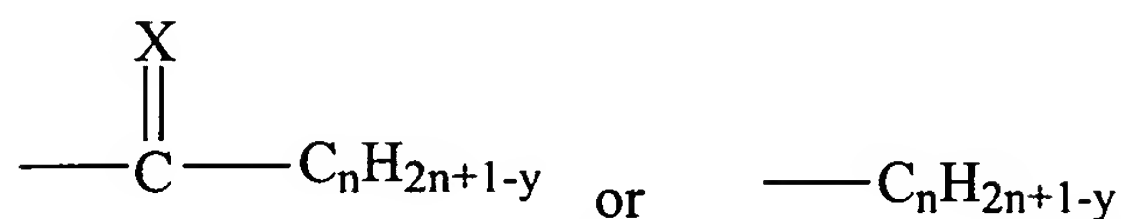
31. (New) The compound of claim 30, wherein the hydrophilic headgroup is poly(ethylene glycol) or C₁-C₆ alkoxy poly(ethylene glycol) and the poly(ethylene glycol) moiety has an average of 1 to about 300 ethylene glycol units.

32. (New) The compound according to claim 31 wherein the poly(ethylene glycol) moiety has an average of between about 10 and 150 ethylene glycol units.

33. (New) The compound according to claim 28 wherein either R¹ or R² is poly(ethylene glycol), C₁-C₆ alkoxy poly(ethylene glycol) or poly(ethylenimine) or N,N-di(aminoethyl)carbamoyloxyethyl- and the other of R¹ or R² is hydrogen; and R³ is selected from the group consisting of cholesterol, a cholesterol derivative and a group of the formula:

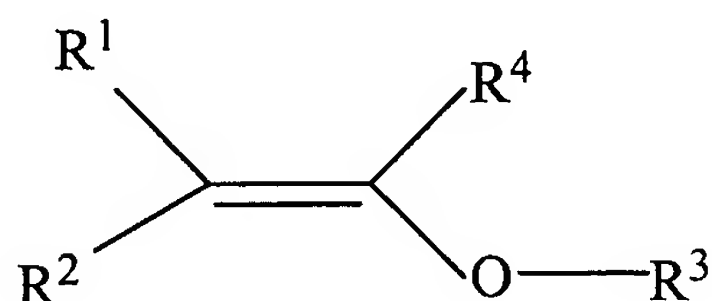


wherein each R^5 is independently a hydrophobic group of the formula:



wherein X is O; n is an integer from 5 to 32 inclusive; y is an even integer from 2 to 12 inclusive; and y is less than or equal to n.

34. (New) A vinyl ether lipid compound of the formula:

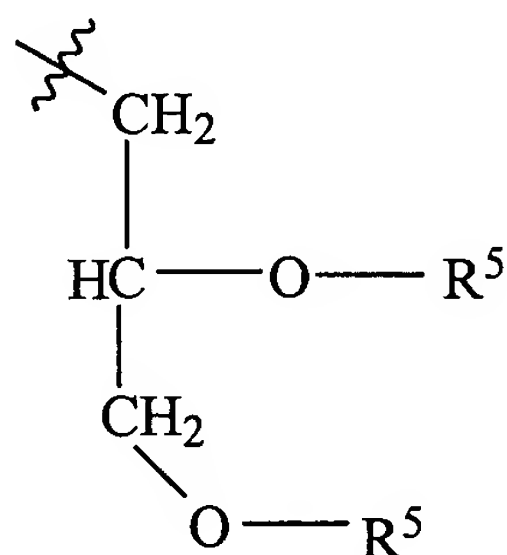


wherein each of R^1 or R^2 is independently a hydrophilic headgroup selected from the group consisting of poly(ethylene glycol), C_1 - C_6 alkoxy poly(ethylene glycol), poly(ethylenimine), N,N-di(aminoethyl)carbamoxyloxyethyl-, choline, monosaccharide, disaccharide, ethanolamine, phosphatidylcholine, phosphatidylethanolamine, cardiolipin, and phosphatidylmonosaccharides and phosphatidyldisaccharides;

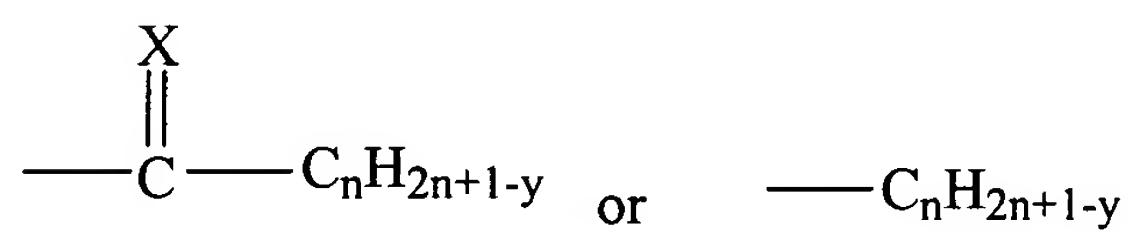
R^3 is an organic hydrophobic moiety; and

R^4 is an electron donating group.

35. (New) The compound according to claim 34 wherein R^3 is selected from the group consisting of cholesterol, a cholesterol derivative and a group of the formula:



wherein each R^5 is independently a hydrophobic group of the formula:



wherein X is O or S; n is an integer from 5 to 32 inclusive; y is an even integer from 2 to 12 inclusive; and y is less than or equal to n.

36. (New) The compound according to claim 34 wherein R^4 is selected from the group consisting of C_1 - C_6 alkoxy, furan, thiophene, methoxyphenyl, dimethoxyphenyl and trimethoxyphenyl.

37. (New) The compound according to claim 35 wherein R^4 is selected from the group consisting of C_1 - C_6 alkoxy, furan, thiophene, methoxyphenyl, dimethoxyphenyl and trimethoxyphenyl.

38. (New) The compound according to claim 34 wherein said hydrophilic headgroups are selected from the group consisting of poly(ethylene glycol), C₁-C₆ alkoxy poly(ethylene glycol) or poly(ethylenimine), N,N-di(aminoethyl)carbamoyloxyethyl-.

39. (New) A lipid vesicle comprising at least two different species of lipid compounds, at least one of said lipid compounds being a vinyl ether lipid compound according to claim 21.

40. (New) A lipid vesicle comprising at least two different species of lipid compounds, at least one of said lipid compounds being a vinyl ether lipid compound according to claim 27.

41. (New) A lipid vesicle comprising at least two different species of lipid compounds, at least one of said lipid compounds being a vinyl ether lipid compound according to claim 28.

42. (New) A lipid vesicle comprising at least two different species of lipid compounds, at least one of said lipid compounds being a vinyl ether lipid compound according to claim 34.

43. (New) The lipid vesicle according to any of claims 39-42 wherein said vinyl ether lipid compound comprises between about 0.1% and about 20% of the total molar lipid concentration of said vesicle.

44. (New) The lipid vesicle of any of claims 39-43 wherein said vinyl ether lipid compound comprises between about 1% and about 15% of the total molar lipid concentration of said vesicle.

45. (New) A method of delivering a therapeutic or diagnostic agent to a predetermined *in vivo* tissue or to the interior of a living cell, comprising contacting said tissue or cell with a liposome encapsulating said agent, under acidic or oxidative conditions, said liposome comprising at least two different species of lipid compounds, at least one of said lipid

compounds being a vinyl ether lipid compound according to any of claims 21, 27, 28 or 34, said acidic or oxidative conditions being effective for cleaving said hydrophilic headgroup from said vinyl ether lipid compound.

46. (New) A pharmaceutical composition comprising a therapeutic or diagnostic agent encapsulated in a lipid vesicle according to any of claims 39-42 in a pharmaceutically acceptable carrier.